

## P. P. TENT COOPERATION TREATY

From the INTERNATIONAL BUREAU

**PCT****NOTIFICATION OF ELECTION**

(PCT Rule 61.2)

Date of mailing (day/month/year) 21 November 2000 (21.11.00)	To:  Commissioner US Department of Commerce United States Patent and Trademark Office, PCT 2011 South Clark Place Room CP2/5C24 Arlington, VA 22202 ETATS-UNIS D'AMERIQUE  in its capacity as elected Office
International application No. PCT/GB00/00762	Applicant's or agent's file reference C882.01/A
International filing date (day/month/year) 03 March 2000 (03.03.00)	Priority date (day/month/year) 12 March 1999 (12.03.99)
Applicant WRIGLEY, Adrian et al	

1. The designated Office is hereby notified of its election made:

in the demand filed with the International Preliminary Examining Authority on:

04 October 2000 (04.10.00)

in a notice effecting later election filed with the International Bureau on:

\_\_\_\_\_

2. The election  was

was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland  Facsimile No.: (41-22) 740.14.35	Authorized officer  Olivia TEFY  Telephone No.: (41-22) 338.83.38
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## INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference C882.01/A	<b>FOR FURTHER ACTION</b>	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
International application No. PCT/GB00/00762	International filing date (day/month/year) 03/03/2000	Priority date (day/month/year) 12/03/1999
International Patent Classification (IPC) or national classification and IPC G06F17/15		
Applicant ADVANCED RENDERING TECHNOLOGY LIMITED et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 12 sheets, including this cover sheet.

This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of sheets.

3. This report contains indications relating to the following items:

- I  Basis of the report
- II  Priority
- III  Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV  Lack of unity of invention
- V  Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI  Certain documents cited
- VII  Certain defects in the international application
- VIII  Certain observations on the international application

Date of submission of the demand 04/10/2000	Date of completion of this report 17.08.2001
Name and mailing address of the international preliminary examining authority:   European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer  Barba, M  Telephone No. +49 89 2399 2732



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**I. Basis of the report**

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):  
**Description, pages:**

1-25                   as originally filed

**Claims, No.:**

1-14                   as originally filed

**Drawings, sheets:**

1/5-5/5               as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- the language of publication of the international application (under Rule 48.3(b)).
- the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- contained in the international application in written form.
- filed together with the international application in computer readable form.
- furnished subsequently to this Authority in written form.
- furnished subsequently to this Authority in computer readable form.
- The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- the description,       pages:
- the claims,              Nos.:

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the drawings, sheets:

5.  This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

*(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)*

6. Additional observations, if necessary:

**III. Non-establishment of opinion with regard to novelty, inventive step and industrial applicability**

1. The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non-obvious), or to be industrially applicable have not been examined in respect of:

the entire international application.  
 claims Nos. 1, 2, 4, 5, 7, 8, 11-14.

because:

the said international application, or the said claims Nos. 1, 2, 4, 5, 7, 8, 11-14 relate to the following subject matter which does not require an international preliminary examination (*specify*):  
**see separate sheet**

the description, claims or drawings (*indicate particular elements below*) or said claims Nos. are so unclear that no meaningful opinion could be formed (*specify*):

the claims, or said claims Nos. are so inadequately supported by the description that no meaningful opinion could be formed.

no international search report has been established for the said claims Nos. .

2. A meaningful international preliminary examination cannot be carried out due to the failure of the nucleotide and/or amino acid sequence listing to comply with the standard provided for in Annex C of the Administrative Instructions:

the written form has not been furnished or does not comply with the standard.

the computer readable form has not been furnished or does not comply with the standard.

**V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

1. Statement

Novelty (N) Yes: Claims 3, 6, 9, 10

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	No:	Claims
Inventive step (IS)	Yes:	Claims 3, 6, 9, 10
	No:	Claims
Industrial applicability (IA)	Yes:	Claims 3, 6, 9, 10
	No:	Claims

2. Citations and explanations  
**see separate sheet**

**VII. Certain defects in the international application**

The following defects in the form or contents of the international application have been noted:  
**see separate sheet**

**VIII. Certain observations on the international application**

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:  
**see separate sheet**

**Re Item III**

**Non-establishment of opinion with regard to novelty, inventive step and industrial applicability**

- 1 In its present drafting, independent claim 1 can be objected as relating to a subject matter on which this International Preliminary Examining Authority is not required, under the implementing regulations, to perform an international preliminary examination for the following reasons (Article 34 (4) (a) and Rule 67 (i) PCT).
  - 1.1 The present application concerns a method of convolving an input data set with a second data set, by providing suitable approximations for values of data elements of said input data set and said second data set in order to approximate the convolution of said data sets with a certain level of accuracy and, consequently, reducing the amount of data to be processed in the convolution calculation. According to the present application the input data set and the second data set are segmented in a plurality of groups each comprising a plurality of data elements, thereafter it is determined whether the elements included in each of said plurality of groups can be represented as having the same value for the purpose of the convolution calculations, by verifying whether values describing the distribution of the values of the group data elements are less than predetermined thresholds. If this condition is met, then all the individual data values for that particular group do not need to be read; moreover, if the difference between the products of the maximum values of two corresponding groups, each from the first and second data sets, and the product of the minimum values is less than a predetermined threshold, then both groups can be represented by their average value and a product only needs to be calculate once in the convolution operation for all the data elements in both groups.
  - 1.2 Insofar as the present text of independent claim 1 can be understood in the light of the description (see Item VIII below), it appears that the subject matter of claim 1 is directed to a method for calculating an approximation of the convolution of an input data set and a second data set comprising the steps of: dividing the elements of each of said data sets in a plurality of groups of data elements; for each group computing values describing how the values of the data elements belonging to said

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group are distributed, wherein said values including minimum value, maximum value and average value; for each group approximating the values of the elements belonging to said group with their average value whether the difference between the maximum value and the minimum value is less than a predetermined threshold value; for each pair combination of said groups, one from each set, computing the products of the maximum values and the product of the minimum values and calculating the convolution of each couple of data elements, each from said pair combination, approximating the value of all the elements of both groups with their respective average values whether the difference between said product of maximum values and said product of minimum values is less than said predetermined threshold value; in case this condition is not valid then calculating the convolution of the data elements of said pair combination by using for the data elements of at least one group of said pair combination their real value.

- 1.3 In the opinion of this Authority, present claim 1 is drafted only in terms of mathematical steps operating on abstract data, wherein said mathematical steps describe the algorithm to compute an approximation of the convolution of two data sets.
- 1.4 Therefore, this International Preliminary Examining Authority considers that the subject matter of present independent claim 1, when considered as a whole, is directed to a mathematical method as such and, consequently, this Authority is not required to give an opinion on the questions mentioned in Article 33.1 PCT (see Article 34 (4) (a) and Rule 67 (i) PCT).
  
- 2 The same type of objection above raised in paragraph 1 to 1.4 of this Written Opinion is considered valid also for the subject matter of present dependent claim 2, the reasons therefor being the following.
  - 2.1 The mere specification of the input data set as "representing a perceivable subject", a part of further unclarities of this wording (see Item VIII below), does not change the fact that said input data are still abstract entities as such and therefore the method of claim 1 is still to be considered as a mathematical method operating on abstract data.

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- 2.2 Therefore, under the provisions of Article 34 (4) (a) and Rule 67 (i) PCT, this Authority is not required to give an opinion on the questions mentioned in Article 33.1 PCT with respect of the subject matter of present dependent claim 2.
- 3 The same type of objection above raised in paragraph 1 to 1.4 of this International Preliminary Examination Report does apply to the subject matter of present dependent claims 4, 5, 7, 8 and 11 to 14.
- 3.1 Therefore, under the provisions of Article 34 (4) (a) and Rule 67 (i) PCT, this Authority is not required to give an opinion on the questions mentioned in Article 33.1 PCT with respect of the subject matter of present dependent claims 4, 5, 7, 8 and 11 to 14.

**Re Item V**

**Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

- 4 When amended along the lines below mentioned (see Item VIII of this International Preliminary Examination Report) and insofar as it can be understood in the light of the description, it appears that, the subject matter of present dependent claim 3 taken into combination with the subject matter of independent claim 1 amended along the lines above (see paragraph 1.5 of this International Preliminary Examination Report) and below mentioned (see Item VIII of this International Preliminary Examination Report) would satisfy the requirements of novelty and inventive step as specified in Article 33 (2) and (3) PCT, the reasons therefor being the following.
- 4.1 According to the description, the convolution methods in the technical domain of signal and image processing as known from the internal prior art have the problem of requiring a big amount of calculations due to the high number of multiplication operations involved in convolution algorithms and to the large set of data involved,

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specially in application of image processing.

- 4.2 The method of claim 3 in combination with the subject matter of claim 1 seeks a solution to this problem of the internal prior art by providing suitable approximations for values of data elements of an image signal input data set and of a second data set in order to approximate the convolution of said data sets with a certain level of accuracy and, consequently, reducing the amount of data to be processed in the convolution calculation.

The solution to the above mentioned problem of the prior art as proposed by claim 3 in combination with claim 1, when amended along the lines set out in this International Preliminary Examination Report, does not appear to be disclosed or rendered obvious by the available prior art, and therefore it would satisfy the criteria of novelty and inventive step as set out in Article 33 (2) and (3) PCT.

- 5 Insofar the text of present claims 6, 9 and 10 can be understood in the light of the description (see Item VIII below) and when said claims would be amended along the lines below mentioned (see Item VIII below), the same type of reasoning of paragraph 4 to 4.2 of this International Preliminary Examination Report would also apply to the subject matter of dependent claims 6, 9 and 10 when taken into combination with the subject matter of claim 1 and claim 3 amended along the lines set out in this International Preliminary Examination Report.

- 5.1 Thus, when amended along the lines set out in this International Preliminary Examination Report (see Item VIII below) and insofar as it can be understood in the light of the description, it appears that the subject matter of present dependent claims 6, 9 and 10 taken into combination with the subject matter of independent claim 1 and dependent claim 3, also amended along the lines set out in this International Preliminary Examination Report, would satisfy the requirements of novelty and inventive step as specified in Article 33 (2) and (3) PCT, for the same reasons above mentioned in paragraph 4 to 4.2 of this International Preliminary Examination Report.

- 6 With regard to the assessment of the present claims 3, 6, 9 and 10 on the ques-

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tion whether they are industrially applicable, the following is stated.

Insofar the text of present claims 3, 6, 9 and 10 can be understood in the light of the description (see Item VIII below) and when said claims would be amended along the lines set out in this International Preliminary Examination Report, it appears that the subject matter of present claims 3, 6, 9 and 10 relates to a method of providing suitable approximations for values of data elements of a physical signal input data set and of a second data set in order to approximate the convolution of said data sets with a certain level of accuracy and, consequently, reducing the amount of data to be processed in the convolution calculation.

Therefore, insofar the text of present claims 3, 6, 9 and 10 can be understood in the light of the description (see Item VIII below) and when said claims would be amended along the lines set out in this International Preliminary Examination Report, it appears that the subject matter of said claims would meet the requirements of industrial applicability as set out in Article 33 (4) PCT.

**Re Item VII**

**Certain defects in the international application**

- 7 The features of present set of claims are not provided with reference signs placed in parentheses (Rule 6.2(b) PCT).

**Re Item VIII**

**Certain observations on the international application**

- 8 The application does not meet the requirements of Article 6 PCT, because present independent claim 1 is not clear for the following reasons.
- 8.1 The wordings "mathematically", "obtaining at least one variance value .... of those elements", "significantly" and "substantially" used in claim 1 are vague and unclear and leave the reader in doubt as to the meaning of the technical features to which they refer, thereby rendering the definition of the subject matter of said claim

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unclear (Article 6 PCT).

- 8.1a In order to remedy this anomaly the applicant is suggested to delete the wordings "significantly" and "substantially" and to amend the others two wordings as it follows:
- i) the wording "mathematically" should be amended as "in the real domain";
  - ii) the wording "at least one variance value ... of those elements" should be amended as "a set of variance values describing the distribution of the values of data elements included in the group".
- 8.2 Moreover, the wording used in paragraph c and d of present claim 1 is also vague and indefinite and as such it creates in the reader a state of uncertainty as to the assessment of the extent of the subject matter claimed, which is against the provisions of Article 6 PCT.
- 8.3 A further reason why the subject matter of present independent claim 1 does not fulfill the requirements of clarity as set out in Article 6 PCT is the following.  
Taking into account the present description and the content of previous paragraph 1.1 and 1.2 of this International Preliminary Examination Report, it is clear that the following features are essential to the definition of the invention:
- i) the definition of the criteria according to which it is determined that the values of the elements of a group can be approximated by their average value;
  - ii) the definition of the criteria according to which it is determined that the convolution of two pair combination of groups can be approximated only using their average values.

Since independent claim 1 does not contain these features it does not meet the requirement following from Article 6 PCT taken in combination with Rule 6.3(b) PCT that any independent claim must contain all the technical features essential to the definition of the invention.

- 9 The wording of present claim 2 as a whole is vague and indefinite and renders the

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subject matter claimed unclear, which is against the provisions of Article 6 PCT. Moreover, the wording of claim 2 is so broad and vague that the person skilled in the art would be unable, on the basis of the information given in the application as filed, to extend the particular teaching of the description to the whole of the fields claimed.

Therefore, the wording of present claim 2 should be amended in order to properly limit the extent of the subject matter intended to be protected in accordance with the subject matter as disclosed in the application as a whole.

- 9.1 Finally, the wording "comprises a representation of a perceivable subject" used in claim 2 is vague and does not have a clear technical meaning; therefore, it creates in the reader a state of uncertainty as to the assessment of the extent of the subject matter claimed, which is against the provisions of Article 6 PCT.
- 10 Also dependent claim 3 is unclear and it does not fulfill the requirements of Article 6 PCT, because the wording "the image signal providing said input data set" is vague and indefinite and does not have a clear technical meaning.
- 11 Dependent claim 10 is unclear and as such it does not meet the requirements of Article 6 PCT for the following reasons.  
The wording "independence on" is vague and indefinite and it does not have a clear technical meaning; in order to overcome this objection the applicant is suggested to amend this wording as "depending on".
- 12 Dependent claim 11 is unclear and as such it does not meet the requirements of Article 6 PCT for the following reasons.  
The wording "significantly" used in claim 11 is vague and unclear and leaves the reader in doubt as to the meaning of the technical features to which it refers, thereby rendering the definition of the subject matter of said claim unclear (Article 6 PCT).

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- 13 Dependent claim 13 is unclear and as such it does not meet the requirements of Article 6 PCT for the following reasons.

The wording "preferably" used in claim 11 is vague and unclear and leaves the reader in doubt as to the meaning of the technical features to which it refers, thereby rendering the definition of the subject matter of said claim unclear (Article 6 PCT).

09/936637

WMLJR

CASE NO: 602-1

NASH JC03 Rec'd PCT/PTO 12 SEP 2001

Please acknowledge  
receipt of the  
enclosed:

"Method For Convolution Of Or Signal Image Data"

APPLICATION NO.: To be assigned

FILING DATE: herewith

1. Transmittal Letter To The United States Designated/Elected Office Concerning A filing Under 35 U.S.C. 371
2. Check No.: 46044 in the amount of \$860.00
3. Amendment Accompanying Application w/ certificate of mailing
4. Return Post Card
5. Express mail certificate

DUE DATE (If Any): September 12, 2001

DATE SENT: September 12, 2001

lmf

"Express Mail" mailing label number  
EL 761 854 395 US

Date of deposit: September 12, 2001

I hereby certify that this paper or fee is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 CFR 1.10 on the date indicated above and is addressed to the Commissioner of Patents and Trademarks, Washington, D.C. 20231.

Richard Sensenbrenner  
(Typed or printed name of person mailing paper or fee)

  
(Signature of person mailing paper or fee)

## PATENT COOPERATION TREATY

PCT

## INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference <b>C882.01/A</b>	<b>FOR FURTHER ACTION</b> see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
International application No. <b>PCT/GB 00/00762</b>	International filing date ( <i>day/month/year</i> ) <b>03/03/2000</b>	(Earliest) Priority Date ( <i>day/month/year</i> ) <b>12/03/1999</b>
Applicant <b>ADVANCED RENDERING TECHNOLOGY LIMITED et al.</b>		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 3 sheets.

It is also accompanied by a copy of each prior art document cited in this report.

**1. Basis of the report**

- a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.
  - the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).
- b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing :
  - contained in the international application in written form.
  - filed together with the international application in computer readable form.
  - furnished subsequently to this Authority in written form.
  - furnished subsequently to this Authority in computer readable form.
  - the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
  - the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2.  **Certain claims were found unsearchable** (See Box I).

3.  **Unity of invention is lacking** (see Box II).

4. With regard to the **title**,

- the text is approved as submitted by the applicant.
- the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,

- the text is approved as submitted by the applicant.
- the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is Figure No.

- as suggested by the applicant.
- because the applicant failed to suggest a figure.
- because this figure better characterizes the invention.

2

None of the figures.

# INTERNATIONAL SEARCH REPORT

International Application No

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**A. CLASSIFICATION OF SUBJECT MATTER**

IPC 7 G06F17/15

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 G06F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 4 991 092 A (GREENSITE FRED) 5 February 1991 (1991-02-05) abstract; claims 1,3 column 3, line 58 -column 8, line 54 column 18, line 67 -column 19, line 16 ---	1-14
A	US 5 341 142 A (REIS JAMES J ET AL) 23 August 1994 (1994-08-23) claims 9-11 ---	1-14
A	US 4 692 806 A (ANDERSON CHARLES H ET AL) 8 September 1987 (1987-09-08) --- -/-	

Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

° Special categories of cited documents :

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier document but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search

15 June 2000

Date of mailing of the international search report

27/06/2000

Name and mailing address of the ISA

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Authorized officer

Diallo, B

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## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	STEPHENS,L.E.; DOWDY,L.W.: "Convolutional Bound Hierarchies" PROC. 1984 ACM SIGMETRICS CONF. MEASUREMENT AND MODELING OF COMPUTER SYSTEMS, 21 - 24 August 1984, pages 120-133, XP000920642 Cambridge, MA, USA the whole document -----	

**INTERNATIONAL SEARCH REPORT**

Information on patent family members

International Application No

PCT/GB 00/00762

Patent document cited in search report	Publication date	Patent family member(s)		Publication date
US 4991092	A 05-02-1991	NONE		
US 5341142	A 23-08-1994	US 5341143 A		23-08-1994
US 4692806	A 08-09-1987	DE 3624818 A GB 2179222 A,B JP 2967986 B JP 62032573 A		05-02-1987 25-02-1987 25-10-1999 12-02-1987